May 16, 1997

Mr Jeff McClenathan (ED-HD)
US Army Corp of Engineers
215 North 17th Street
Omaha, NE 68102-4978

Dear Mr. McClenathan:

Thank you for the opportunity to provide comments concerning the Probable Maximum Precipitation values for the Cherry Creek drainage basin. These comments are based on an evaluation of the most significant storms which have occurred along the Front Range of Colorado and their influence on the determination of PMP values in HMR 55A.

For the central Front Range, the Cherry Creek storm of 1935 by far provides the largest rainfall values. However, I have the following concerns about the analysis of the actual storm rainfall values and how the isohyetal analysis was used in HMR 55A to provide design values for the PMP determination along the Front Range:

1. The values associated with the maximum one hour rainfall should be re-evaluated. Questions remain on the validity of the measurement of 11 inches attributed to the first hour of the storm based on water measured in a horse trough, especially considering that it appears that rainfall on the order of a couple of inches fell over the region during the previous evening.

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2. The location the storm center with respect to the Palmer Ridge, i.e. just downwind of the ridge, is consistent with other extreme rainfall events (e.g. Plum Creek, 1965) with the associated storm isohyetal patterns showing sharp decreases beyond about 15 miles downwind, i.e. to the north and northwest. If the Palmer Ridge does provide a significant or even a dominant influence on the position of the storm center, transpositioning constraints may be appropriate in positioning the design storm over the watershed when computing the PMF.

3. Other large rainfall storm centers along the Front Range, e.g. west of Denver, are located over the foothills or even further up the east slope of the Rockies, suggesting a "rainshadow" for extreme storm rainfall centers over portions of the region between the Palmer Ridge and the foothills to the northwest.

4. The maximization procedure used in HMR 55A used a storm representative dew point value which was computed using observations taken 560 miles to the southeast. Possibly a re-analysis could identify observational data closer to the rainfall event which would more accurately represent the moist mass which provided the available moisture for the storm dynamics to convert to rain on the ground.

5. The accepted depth-area-duration values used together with the maximization factor of 163% produced maximized rainfall values which were not consistent with and significantly larger than maximized values derived from analyses of other large storm events along the Front Range. To provide a more consistent analysis, the values were undercut (decreased) by about 15% by the authors of HMR 55A. Current PMP evaluations impose an upper limit of 150% when applying maximization factors to storm D-A-D's. Possibly an updated dew point analysis as discussed in 4. above would provide an improvement for the maximization factor.

6. The Bureau of Reclamation re-examined the Cherry Creek storm in 1985 and produced an updated depth-area-duration analysis which contained slightly lower values. However, the rainfall values (see item 1. above) and mass curves from previous studies were not evaluated for reliability and internal consistency.

7. The NOAA Hydrometeorology Office completed a site-specific PMP study for the Cherry Creek drainage basin for the Corp of Engineers in July, 1995. They basically extended the non-orographic procedures provided in HMR 52 westward to compute the design storm for the basin. Critical centering of the design storm assumes no orographic influence of the Palmer Ridge. This assumption is questioned by Dr Jarrett of the USGS in Denver; Mr Loren Crow, a private Certified Consulting Meteorologist in Denver; and Mr Nolan Deskins of the Colorado Climate Center as well as myself. Although quantification of the influence of topography on this and other Front Range storms has yet to be determined, it provides a significant open issue for PMP analyses along the Front Range.

I hope the presentation of these issues is useful to the Corp of Engineers in your evaluation of the design PMF for Cherry Creek. Please feel free to contact me with any further question you may have.

Sincerely,

Edward M. Tomlinson, PhD

cc: Dr Jarrett, USGS
Mr Nolan Deskins, Colorado Climate Center